CUSTOMER NO. 46850 *PATENT*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Attorney Docket No. Kodialam 26-26-3

In re application of: Muralidharan Kodialam et al.

Serial No.:	10/776,466	Group Art Unit:	2616
Filed:	2/11/04	Examiner:	Andrew Lai
Matter No.:	990.0489	Phone No.:	571-272-9741

For: Traffic-Independent Allocation of Working and Restoration Capacity in Networks

DECLARATION UNDER 37 C.F.R. 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I, Muralidharan Kodialam, reside at 5 Bella Vista Court, Marlboro, New Jersey. I am one of the inventors of the subject matter of the current patent application and I am familiar with the prosecution of this application.

2. Claim 1 of the application recites that the network constraints include:

1) for each link, a set of one or more detour paths exist whose capacities sum to the working capacity of the link;

2) for each link, the sum of the working capacity and the restoration capacity shared by the set of one or more detour paths is, at most, a total capacity of the link; and

3) the working capacity of the network is maximized.

In rejecting claim 1, the Examiner states that U.S. Patent Application Pub. No. 2002/0071392 ("Grover") discloses the Applicant's constraint 2, namely, "for each link, the sum of the working capacity and the restoration capacity shared by the set of one or more detour paths is, at most, a total capacity of the link," citing to Grover's constraints (2) and (5), as set forth in paragraphs [0021] and [0022] of Grover. The Examiner argues that "since both constraints (2) and (5) must be met simultaneously, the combination of the two constraints ensures the claimed limitation." This conclusion is erroneous. There is a fundamental difference in the formulation in Grover and this patent application. The problem that is addressed in

Grover is a **network design problem.** The objective of the formulation is to design a network at minimum cost. There are **no capacity constraints** in the formulation. The objective function (Equation (1)) is just the cost of designing the network. In this patent, the Applicant assumes that the network is given, and the objective is to route the traffic. Since the network is specified, in particular the link capacities are given, the **routing has to respect these link capacities**. It is not possible to convert a linear network design problem into one with capacities. Therefore, there is no way that combining Grover's constraints (2) and (5) can possibly yield Applicant's constraint 2.

3. Grover's constraint (2) is:

$$\sum_{q \in Q^r} g^{r,q} = d^r \qquad \forall r \in D$$

As explained in the reference table between paragraphs [0020] and [0021] of Grover, the variable $g^{r,q}$ represents working capacity assigned to the qth eligible working route for demand pair r, and the variable d^r represents the number of demand units for O-D pair r. Therefore, Grover's constraint (2), which, according to Grover, "ensure[s] that all working demands are routed," essentially states that the working capacity for a given demand pair is equal to the demand for that pair.

4. Grover's constraint (5) is:

$$s_j \geq \sum_{p \in P_i} \delta_{i,j}^p \cdot f_i^p \qquad \forall (i, j) \in S \times S: i \neq j$$

As explained in the reference table between paragraphs [0020] and [0021] of Grover, the variable s_j represents the number of spare capacity units placed on span j, the variable $\delta_{i,j}^p$ has a value of 1 if the pth eligible route for restoration of span i uses span j and zero otherwise, and the variable f_i^p represents the restoration flow assigned to the pth eligible restoration route for span i. Therefore, Grover's constraint (5), which, according to Grover, "forces sufficient spare capacity on each span j such that the sum of the restoration paths routed over that span is met for failure of any span i," essentially states that the number of spare capacity units placed on span j is greater than or equal to the restoration flow for the restoration of span i.

5. While Grover's constraint (2) ensures that working capacity for a given demand pair is equal to the demand for that pair, and Grover's constraint (5) ensures that the number of spare capacity units placed on span j is greater than or equal to the restoration flow for the restoration of span i, no combination of these two constraints can possibly yield the Applicant's constraint 2, namely, that "for each link, the sum of the working capacity and the restoration capacity shared by the set of one or more detour paths is, at most, a total capacity of the link." Indeed, there is nothing in Grover's constraints (2) and (5) to ensure that the sum of working capacity and restoration capacity of a set of detour paths does not exceed link capacity. In other words, it is possible that both of Grover's constraints 2 and 5 can be satisfied, i.e., working capacity for a given demand pair equals demand for that pair, and a given span j has sufficient spare capacity units to handle restoration flow for span i, at the same time that the sum of working capacity and restoration capacity exceeds total link capacity, because there is no constraint in Grover to prevent this.

6. To the contrary, equation (8) of the Applicant's specification provides an example of the Applicant's constraint 2, as follows:

$$\sum_{P:P\in P_e} f(P) + \sum_{P:P\in P_f, e\in P} f(P) \le u_e \qquad \forall f \neq e, \quad e, f \in E \qquad (8)$$

This constraint states that "the working capacity on link e plus the restoration capacity that appears on link e due to failure of link f ($f \neq e$) is at most the capacity u_e of link e" (specification, at p. 11, lines 9-12).

7. The Examiner states on page 11 of the office action that the "Examiner respectfully disagrees with the equating of Applicant's constraint 2 to said formula (8) because constraint 2 is with respect to both *working/restoration capacities* while formula (8) recites about only the *restoration traffic*" (emphasis in original). However, this is a misinterpretation of Applicant's equation (8), because equation (8) not only represents restoration traffic via the expression $\sum_{P:P\in P_f, e\in P} f(P)$, but also represents working capacity via the expression $\sum_{P:P\in P_e} f(P)$. The expression $\sum_{P:P\in P_e} f(P)$ is shown in equation (5) on page 9 of Applicant's specification as being equal to x_{ij}, which is defined as "the working capacity on link (i,j)," and "[a]mong the paths in the set P_{ij}, those that form the detour paths for link (i, j) have their $f(P)$ values sum to x_{ij}, as expressed in equation (5):

$$\sum_{P:P\in P_{ij}} f(P) = x_{ij}, \qquad (5)"$$

(specification, at p. 9, lines 2-12).

8. Constraints (2) and (5) of Grover, even taken in combination, do not disclose any constraint involving a sum of both restoration traffic and working capacity, to ensure that the link capacity u_e of a link e is not exceeded, as required by claim 1. Nor do the other portions of Grover cited by the Examiner disclose such a constraint – there is simply no such constraint disclosed, taught, or even suggested in Grover.

9. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

March 4, 2008
Date

Muralidharan Kodialam